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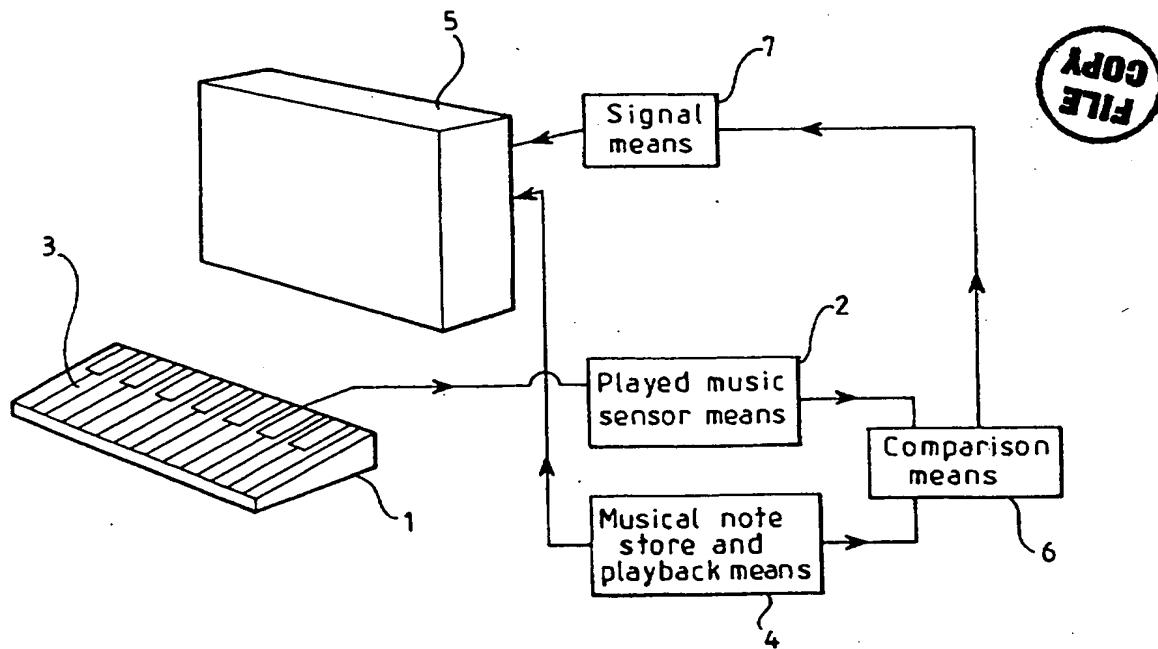
(56) Documents Cited
EP 0837436 A1 US 5728960 A

(58) Field of Search
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(54) Abstract Title

Interactive music display device

(57) An interactive music display device has a screen 5 which displays in sequence notes from a musical note store and playback means 4 and associated comparison mean 6 compares the displayed musical composition with musical notes played by an instrumentalist which are sensed by sensor means. Variations from the displayed portions of the musical composition are conveyed to signal means 7 which can signal the variations to the instrumentalist either in real time as the music is being played or at the end of the musical composition, to thereby interact with the instrumentalist and provide a teaching function for playing the music correctly.

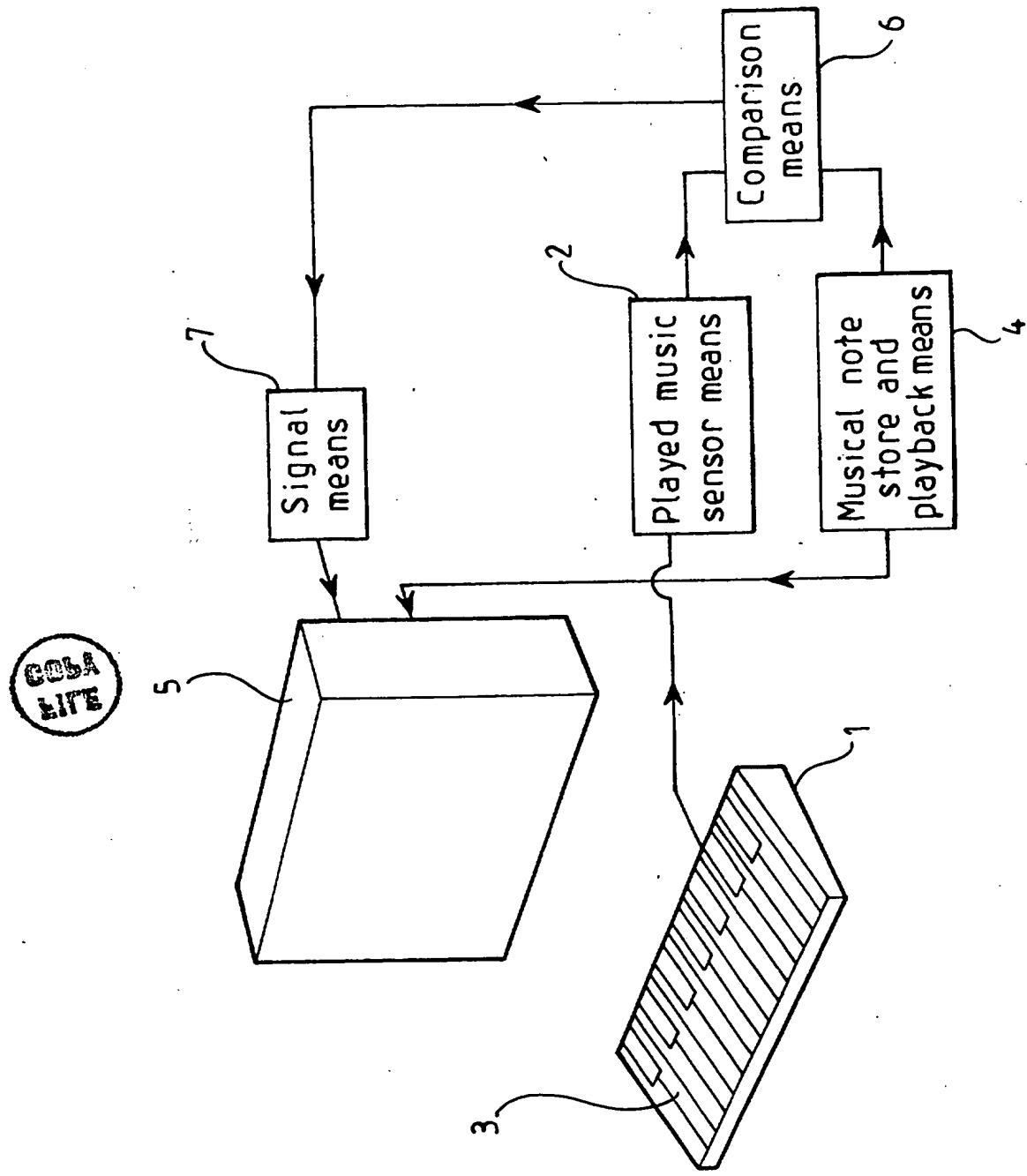


At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date but within the period prescribed by Rule 25(1) of the Patents Rules 1995.

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Interactive Music Display Screen

This invention relates to display screens for displaying musical notes from a musical composition to be played by an instrumentalist.

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Electronic music display screens are known which display musical compositions to be played by an instrumentalist and it is even known to record music direct from an electronic keyboard and convert it via a suitable computer programme to recorded music in notation form which can be displayed upon a visual display screen. In 10 one system known as "Q Bass" music played from an electronic keyboard is recorded and at the end of the musical composition it can be displayed and/or printed out for subsequent use.

The present invention is derived from the realisation that it would be 15 advantageous for such a display screen to inter-react with the instrumentalist to present information relating to the music to be played whilst it is being played by the instrumentalist.

According to the invention there is provided an electronic music display 20 device including a display screen, store means for storing a musical composition, playback means for retrieving and displaying on the display screen in sequence successive sections of the musical composition in the store means, played music sensor means for sensing music played by an instrumentalist in response to display of the said successive sections of the musical composition being displayed on the display screen, comparison means for

comparing the sensed music with the musical composition, and signal means for visually and/or audibly notifying the instrumentalist of incorrect or unwanted variations between the music played and the musical composition displayed by the display screen.

5 Conveniently, the electronic music display device is portable and can fit onto a music stand in substitution for printed music and may display a musical composition stored electronically, such as on a floppy disc, or optically, such as on a compact disc. Either way, a selection of musical compositions can be retrieved from one or more such store means and played back for subsequent display on the display screen
10 sequentially in successive sections of the musical composition to permit an instrumentalist to read and play successive notes in time with the sections of the musical composition being displayed.

Conveniently, the music display device includes metronome means for
15 audibly or visually indicating to the instrumentalist the correct timing of notes to be played.

The sensor means may indirectly sense the notes actually played by the instrumentalist, such as by the use of a microphone, or may in the case of, for example,
20 a keyboard instrument, instead directly sense the key depressed by the instrumentalist and hence the note played for subsequent comparison with that part of the musical composition being displayed on the display screen to thereby determine whether the correct note has been played at the correct time and for the correct duration by the instrumentalist. Where notes to be sensed are from a keyboard instrument such as a piano

or organ, the sensor means may be directly connected to the instrument, which may include or be fitted with individual sensors indicating playing of individual keys. Alternatively, where the keyboard is electronic the sensing of the keys being depressed by the instrumentalist may, in turn, be achieved electronically, for subsequent comparison 5 with the section of the musical composition being displayed on the display screen at that time.

The display means for visually and/or audibly notifying the instrumentalist of incorrect or unwanted variations between the music being played by the instrumentalist 10 and that part of the musical composition being displayed on the display screen may typically be in the form of a flat liquid crystal display screen connected to the signal means, which screen successively displays sections of a musical composition to be played in accordance with music stored in the music store means and, by virtue of the interaction with the music sensor means sensing actual notes played by the instrumentalist, displays 15 either visually or audibly an alarm signal indicating, for example, that a particular note is the wrong note, the timing is wrong or the duration is wrong.

Alternatively, the display may simply continue to display in sequence the musical composition until the completion thereof by the instrumentalist and thereafter with 20 a playback function indicate, for example through flashing notes or other visual or audible means, which parts of the musical composition played by the instrumentalist differ from the musical composition stored in the music store means, thereby to indicate to the instrumentalist any errors in the music played and, in particular, how to correct such errors. This may include a means indicating which note should have been played or which

note should have been played at a particular time, or for a particular duration including, without limitation, the tempo of the piece to be played at that time.

Conveniently, where the display screen shows e.g. two pages of a musical
5 composition having more than two pages, a page turning facility may be provided such that when the musician reaches a given point, typically the last two bars on the bottom of the second page, the next two pages are then automatically displayed, and so on. This may be achieved by correlating music actually played and detected by the music sensor means with the comparison means or the page may be turned automatically in accordance with
10 when the music should have been played.

The invention will now be described, by way of example only, with reference to the accompanying drawing which shows in schematic form a simplistic arrangement for carrying out the invention.

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In the drawing an electronic keyboard (1) is shown electrically connected to music sensor means (2) which can directly sense which of a number of keys (3) have been depressed, including when the key was depressed and for how long.

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Musical composition store means (4) is electrically connected to a display screen (5), which may typically be a liquid crystal display screen, which displays in sequence the notes of the musical composition to be played such that an instrumentalist can play the keyboard (1) in accordance with musical notes that are successively displayed on the screen (5). As the musical composition is being played comparison means (6)

continually compares the musical notes from that part of the musical composition being displayed on the screen (5) with the notes actually played by the instrumentalist as sensed by the music sensor means (2) and any difference in either the note, the timing or the duration of the note actually played by the instrumentalist is fed to signal means (7) which 5 then analyses the difference and sends a signal directly to the display screen (5) to indicate what that difference was.

This may be in real time so that the instrumentalist is able to see immediately what errors have been made, or can hear immediately in the event that the 10 signal means produces an audible signal, or the collective errors detected by the comparison means (6) may be stored, to be re-played either periodically during the playing of the musical composition or at the end of the musical composition.

The invention therefore provides a means by which an instrumentalist of 15 any instrument for which the notes are capable of being sensed by music sensor means, can interact with a correctly played musical composition by being alerted to variations therefrom and, in a preferred embodiment of the invention, can be shown what corrective steps need to be taken in order to play the musical composition correctly.

20 Although the invention has been described with reference to an electronic keyboard, it will be readily apparent that the invention may be adapted for use in other instruments including non-electric instruments such as conventional pianos which may be fitted with sensor means for sensing the playing of individual notes including when they are played, for how long and how loudly, without departing from the spirit or scope of the

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invention.

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CLAIMS

1. An electronic music display device including a display screen, store means for storing a musical composition, playback means for retrieving and displaying on the display screen in sequence successive sections of the musical composition in the store means, played music sensor means for sensing music played by an instrumentalist in response to display of the said successive sections of the musical composition being displayed on the display screen, comparison means for comparing the sensed music with the musical composition, and signal means for notifying the instrumentalist of incorrect or unwanted variations between the music played and the musical composition displayed by the display screen.
2. An electronic music display device according to Claim 1 adapted to fit onto a music stand in substitution for printed music for displaying a musical composition.
3. An electronic music display device according to Claim 1 or Claim 2 in which the musical composition is displayed sequentially in successive sections to permit an instrumentalist to read and play successive notes in time with the sections of the musical composition being displayed.
4. An electronic music display device according to any preceding claim including metronome means for audibly or visually indicating to the instrumentalist the correct timing of notes to be played.

5. An electronic music display device according to any preceding claim in which the sensor means indirectly senses the notes played by the instrumentalist, such as by the use of a microphone.

5 6. An electronic music display device according to any one of claims 1 to 4 in which the sensor means directly senses keys depressed by the instrumentalist.

7. An electronic music display device according to any preceding claim in which, where notes to be sensed are from a keyboard instrument, the sensor means is directly connected thereto and includes individual sensors indicating playing of individual keys.

15 8. An electronic music display device according to any one of claims 1 to 6 in which where notes to be sensed are from an electronic keyboard instrument the sensing of the keys being depressed is achieved electronically without the use of individual sensors for individual keys.

9. An electronic music display device according to any preceding claim in which the musical composition is displayed on a flat liquid crystal display screen connected to the signal means, which screen successively displays sections of a musical composition in accordance with music stored in the music store means and, by virtue of the interaction with the music sensor means sensing actual notes played by the instrumentalist, visually or audibly indicates variations between actual notes played and notes displayed.

10. An electronic music display device according to any one of claims 1 to 8 in which the musical composition is displayed until the completion thereof by the instrumentalist and thereafter a playback function indicates variations from the musical composition played by the instrumentalist.

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11. An electronic music display device according to any preceding claim further including a page turning facility which correlates music actually played and detected by the music sensor means with the comparison means to electronically turn the page of a musical composition just prior to the completion of a page played by the
10 instrumentalist.

12. An electronic music display device according to any one of claims 1 to 10 including an automatic electronic page turning facility for turning successive pages in accordance with when the music should have been played by the instrumentalist.

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13. An electronic music display device substantially as hereinbefore described.

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The
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Application No: GB 9910062.0
Claims searched: 1-13

Examiner: David Summerhayes
Date of search: 4 August 1999

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): G5X (X1, X6, X8)

Int Cl (Ed.6): G09B 15/00; G10G 1/00

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	EP 0837436 A1 (YAMAHA)	1-12
X	US 5728960 (SITRICK) - see particularly col.9, lines 14 to 45 and Fig.2E	1-12

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

